

CLAIMS

1. Method for forming a semiconductor substrate that may be dismantled, comprising the
5 following steps:

- introduction of gaseous species in the substrate (1) according to conditions allowing the constitution of an embrittled layer (4) by the presence in said layer of micro-cavities and/or micro-bubbles, a
10 thin film of semiconductor material thus being delimited between the embrittled layer (4) and one face (2) of the substrate,

- thermal treatment of the substrate to increase the brittleness level of the embrittled layer
15 (4), said thermal treatment being continued until the appearance of local deformations on said face (2) of the substrate (1) in the form of blisters but without generating exfoliations of the thin film during this step and during the continuation of the method,

20 - epitaxy of semiconductor material (6) on said face of the substrate to provide at least one epitaxial layer on said thin film.

2. Method according to claim 1,
25 characterised in that the introduction of gaseous species is carried out by ion implantation or plasma immersion implantation.

3. Method according to claim 2,
30 characterised in that the introduction of gaseous species is carried out by plasma immersion

implantation, the method is applied on two faces of the substrate.

4. Method according to claim 1,
5 characterised in that, before the step of thermal treatment of the substrate, it provides for a step of forming a thickener, the thickness of which is sufficiently large so as not to generate exfoliations in the thin film and sufficiently small to avoid the
10 separation of the substrate at the level of the embrittled layer during the step of thermal treatment of the substrate.

5. Method according to claim 4,
15 characterised in that the thickener is totally or partially eliminated before the epitaxy step.

6. Method according to claim 1,
characterised in that it provides for an additional
20 step of subjecting the epitaxial layer to at least one step of forming components (7).

7. Method according to claim 6,
characterised in that said step of forming components
25 (7) is a step of forming photovoltaic components.

8. Method according to any of the previous claims, characterised in that it provides for an additional step of forming a protective layer on the
30 epitaxial layer, said protective layer being intended to protect the epitaxial layer from a chemical attack

intended for the separation of the substrate at the level of the embrittled layer.

9. Method for obtaining an element of semiconductor material, characterised in that it comprises the following steps:

- providing a semiconductor substrate that may be dismantled obtained by the method according to any of claims 1 to 8,
- 10 - dismantling of the semiconductor substrate that may be dismantled by detachment of this substrate at the level of the embrittled layer, the separation being either total to provide an element of semiconductor material forming a membrane and
15 consisting of the thin film of semiconductor material and the epitaxial layer, or partial to provide one or several elements of semiconductor material forming one or several components and consisting of a part of the thin film of semiconductor material and the epitaxial
20 layer.

10. Method according to claim 9, characterised in that it provides for an additional step of fastening of the epitaxial layer onto a support
25 before the step of dismantling.

11. Method according to claim 9, characterised in that the detachment results from the
30 application of a tensile stress and/or a shear stress.

12. Method according to claim 9, characterised in that the detachment results from the implementation of a step of introducing additional gaseous species into the embrittled layer, then a step
5 of mechanical stress and/or thermal treatment of the embrittled layer.

13. Method according to claim 9, characterised in that the detachment results from the
10 application of an opening stress at the level of the embrittled layer.

14. Method according to claim 9, characterised in that the detachment results from a
15 chemical attack of the embrittled layer.

15. Method according to claim 9, characterised in that the detachment results from a treatment by sound waves of the embrittled layer.
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16. Method according to any of claims 9 to 15, characterised in that the step of providing a semiconductor substrate that may be dismantled comprises providing a substrate that has already been
25 dismantled and that is obtained by the method according to any of claims 1 to 8 with prior surface conditioning.